

**GOOD PRACTICE GUIDE**

# **Safe Use of Concrete Pumps**



# Safe Use of Concrete Pumps

## CPA Good Practice Guide



**Working in Partnership**

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## Foreword

Concrete pumps and concrete placing booms make a significant contribution to the efficient delivery of the construction process. The development of concrete pumps has allowed concrete to be pumped under pressure through pipelines across great distances and in significant volumes. Unfortunately the very versatility that makes them so useful also provides scope for unsafe use, this has led to a significant number of serious accidents, tragically including some fatalities. Not only do these accidents have a terrible cost in terms of human suffering, they also have a significant financial cost for all concerned. Consequently there is a very strong business case for improving safety performance.

As with all construction equipment, the safe operation of concrete pumps depends on a number of factors including the selection and maintenance of the pump and placing boom, the planning and supervision of their use, and the competence of the operator and other personnel. If any of these are deficient, the risk of a serious accident increases significantly, so it is essential that site managers ensure that all concrete pumping operations are planned, supervised and carried out safely.

This guidance has been prepared by a Working Group representing all parts of the industry, including the Health and Safety Executive, to provide clarity on the safe use of concrete pumps; including planning, role of personnel, training and familiarization of personnel, safe use, maintenance, inspection and thorough examination. The guidance is straightforward, comprehensive and easy to adopt. It represents good practice which may go further than the minimum you need to do in order to comply with the law.

I thank those who have been involved in its preparation and commend the guidance to anyone who owns, supplies or controls the operation of concrete pumps. Please read the publication and turn the advice into action.



### **Heather Bryant**

HM Chief Inspector of Construction

Chair of the Health and Safety Executive's Construction Industry Advisory Committee (CONIAC).

## **1.0 Introduction and Scope**

This Good Practice Guide has been prepared by the British Concrete Pumping Interest Group, a part of the Construction Plant-hire Association.

It should be used in conjunction with the relevant legislation and guidance to ensure the safe use of concrete pumps. This document will provide the guidance necessary to ensure that the operations involving concrete pumps are carried out safely and efficiently.

It has become clear to members of the Interest Group that such a Good Practice Guide is necessary to define safe systems of work to ensure the solid foundations required for safe and successful operations.

It should be noted that this document provides the minimum requirements for the operation of all types of concrete pumps, in addition to any other guidance and legislation that might be appropriate.

The Good Practice Guide gives recommendations for the safe use of truck-mounted concrete pumps; some sections will apply to the use of static concrete pumps, trailer-mounted concrete pumps and tower-mounted booms. It does not cover plaster and screed pumps.

It does not relate to the construction of the machine; this is covered by the European Standard for concrete pumping and spraying machines, etc. BS EN ISO 12001.

## 2.0 Definitions

For the purposes of this Good Practice Guide, the following definitions apply:-

### 2.1 ***additive***

a material which is added to concrete to change the properties of the mix

### 2.2 ***ball catcher***

a device fitted to the delivery end of a pipeline designed to catch the sponge rubber device used for cleaning the pipeline

### 2.3 ***banksman***

a person who has had training to give directions to the operator of a vehicle mounted concrete pump during manoeuvring of the vehicle on site, by a recognised code of signals or by verbal communication

### 2.4 ***blanking device***

a component designed by the concrete pump manufacturer fitted securely at the outlet end of a placing or delivery hose with a coupling or other device to prevent concrete from falling out of the hose whilst the concrete placing boom is being moved to a new position

### 2.5 ***boom tip safety chain***

a chain fitted to the end of the concrete placing boom which is attached to the placing hose and which is designed to retain the placing hose if the coupling attaching it to the boom pipeline fails

### 2.6 ***competent person***

a person who has such practical and theoretical knowledge, experience and training as necessary to safely carry out the functions to enable him/ her to carry out his/her duties without risk to himself or any other persons and without risk of damage to plant or property

**NOTE:** An example of a nationally and industry recognised training scheme for the operation of a concrete pumping machine (mobile or trailer) is the Construction Plant Competence Scheme (CPCS) or equivalent.

### 2.7 ***concrete***

a homogenous mix of cement, graded aggregate and water, to which non-toxic additives may be added

### 2.8 ***concrete placing boom***

a device to support and position the delivery pipeline. It can incorporate folding, derricking and slewing motions

### 2.9 ***concrete pump***

an item of plant used for pumping or spraying concrete. It works by pistons or a rotary pump, whereby the material to be transported is conveyed to the placing position through a pipeline alone or through a pipeline attached to a concrete placing boom.

### 2.10 ***delivery hose***

a flexible hose used in the pipeline other than as a placing hose i.e. a double ended hose

- 2.11 *him, his and himself***  
can also mean the female equivalent
- 2.12 *Hirer***  
company, firm, person, corporation or public authority taking the Owner's plant on hire, including their successors or personal representatives
- 2.13 *inspection certificate***  
document containing the results of an inspection of the concrete pump by a competent person and including the details specified in **Annex 6**
- 2.14 *interlock***  
a switch usually located on the hopper which prevents operation of the machine when activated
- 2.15 *linesman***  
person supplied by owner or hirer trained to work with concrete delivery pipelines
- 2.16 *Owner***  
company, firm or person letting the concrete pump on hire, including their successors, assignees or personal representatives
- 2.17 *pipelines or delivery lines***  
pipes, whether steel or rubber, through which the concrete is conveyed. They will include, pipes, bends, hoses, coupling connectors and any valves inserted in the line. Each element of the line must be capable of resisting the likely maximum pressure exerted by the concrete pump
- 2.18 *placing hose***  
a flexible single ended hose to provide freedom of movement in the final placing of concrete
- 2.19 *receiving hopper***  
the area into which the mixed concrete is discharged. It will generally contain the valve gear for transferring the concrete from the concrete pistons into the delivery line. It may also contain mixer paddles on a revolving shaft. Access doors and an interlocked protective grille must be fitted to prevent persons from coming into contact with the moving machinery
- 2.20 *remote control box***  
a portable control panel which is connected to the concrete pump by a wired or wireless system, allowing the concrete pump operator to operate the machine from a remote position. The control levers / switches may operate the placing boom movements, the concrete pump and the vehicle engine
- 2.21 *safety induction training***  
instruction given by the principal contractor or the Hirer to communicate the site safety rules, safe access on the site, the location of welfare facilities, etc. The provider of the training may determine that the delivery of induction training on the first visit to the site is sufficient but may insist on further training if site conditions change significantly

**2.22 *signaller***

a person who has had training to give directions to the concrete pump operator by a recognised code of signals or by verbal communication

**2.23 *sponge rubber cleaning device***

a piece of sponge rubber, usually in the shape of a ball, which is inserted into the delivery pipeline for the purpose of cleaning the inside of the pipes. It is propelled along the pipeline either by the action of the pump (forward or reverse), by compressed air or by water pressure

**2.24 *stabilisers***

extendable structural members on the pump unit to increase the dimensions of the stability base

**2.25 *trailer-mounted concrete pump***

a concrete pump that is mounted on a trailer that can be towed (also known as a static pump)

**2.26 *truck-mounted concrete pump***

a concrete pump that is mounted on a self-propelled lorry

**2.27 *wash out adapter***

a short length of pipe with one end blanked off and a connection for a water / compressed air hose for cleaning purposes. A secondary valve(s) should be fitted for releasing the pressure when necessary, also a working pressure gauge

### 3.0 Selection of Personnel

The safe operation of a concrete pump relies heavily on the selection of suitable personnel who are competent to carry out the required duties. Those responsible for the selection should ensure that an operator is efficiently organised in order to promote good teamwork in the working situation.

Nobody should be selected whose efficiency is impaired by alcohol, drugs or other influences. Employers should have a policy on drugs and alcohol.

#### 3.1 Operator Requirements

The concrete pump operator should:-

- a. be competent;
- b. be over 18 years of age if operating a concrete pump on the site and over 18 years of age if driving a concrete pump on the highway;

**NOTE:** *The minimum age of 18 years only applies if one of the following criteria are met:*

- *The driving test and Driver Certificate of Professional Competence (Driver CPC) Initial Qualification have been passed;*
- *The operator is learning to drive or taking a driving test for this category or Driver CPC Initial Qualification;*
- *The operator is taking a national vocational training course to get a Driver CPC Initial Qualification;*
- *The operator had his driving license before 10 September 2009, the CPC periodic training must be taken within five years of this date.*

*If these criteria are not met, the minimum age is 21 years.*

- c. have adequate communication skills;
- d. be medically and physically fit, with particular regard to eyesight, hearing and reflexes; (see 3.2)
- e. be physically able to operate the concrete pump safely;
- f. be able to judge distances, heights and clearances;
- g. be adequately trained and certified for the class of concrete pump which he operates; CPCS or equivalent (see 2.8)
- h. have sufficient knowledge of the machine and its safety devices;
- i. be fully conversant with the duties of the signaller and should understand the signals code agreed with him;
- j. be authorised to operate the machine;
- k. in the case of a mobile concrete pump operator, be qualified to drive a large goods vehicle (Class C).

#### 3.2 Medical Fitness

Employers have a duty to both ensure the health of their employees and to ensure that any employee is fit to undertake the tasks they are required to carry out by ongoing assessment. Further guidance on assessing the medical fitness of construction plant operators is given in the Strategic Forum for Construction - Plant Safety Group *Medical Fitness to Operate Construction Plant - Good Practice Guide*.

### **3.3    *Signaller Requirements***

An appointed signaller should be able to:

- a.**    Relay signals from the placing gang to the pump operator;
- b.**    Direct safe movement of the concrete placing boom;
- c.**    Give clear and precise verbal instructions where audio equipment, e.g. a two-way radio, is used.

## 4.0 Training and Certification

**NOTE:** *The Health and Safety at Work etc. Act 1974 Section 2(2)(c) requires the employer to ensure, so far as is reasonably practicable, that employees receive “such information, instruction, training and supervision as is necessary to ensure” their health and safety at work.*

### 4.1 Training Syllabus

The training of the concrete pump operator should include:-

- a. safety awareness;
- b. knowledge of the employer's and site risk assessments;
- c. knowledge and use of any personal protective equipment (PPE) provided;
- d. pre-driving checks;
- e. necessary daily and weekly checks and maintenance of the machine;
- f. safe siting, rigging and de-rigging of the concrete pump in accordance with the manufacturer's instructions, in site conditions;
- g. operating the concrete placing boom safely, if applicable;
- h. operating the concrete pump;
- i. cleaning the concrete pump out;
- j. working with delivery lines;
- k. basic knowledge of concrete composition;
- l. awareness of the dangers of compressed air;
- m. working adjacent to overhead power lines;
- n. dealing with emergency situations;
- o. working with blockages;
- p. personal health and safety considerations;
- q. driving the lorry, if applicable;
- r. documentation in relation to the job.

### 4.2 Training Standards

The training should be to a national recognized standard that is measurable, e.g. the Construction Plant Competency Scheme (CPCS categories A06, A44 & A72). The completion of training must be followed by the issue of a CPCS card or equivalent.

Concrete pump operator competence can be assessed further by the attainment of a Level 2 National Vocational Qualification for Specialist Plant and Machinery Operations Concrete Pumping (QCF).

### 4.3 Periodic Assessment

Periodic assessments of each concrete pump operator should be carried out by a competent person to verify the maintenance of safe standards and to assess any further training needs.

### 4.4 Transfer to a Different Machine

Specific training and assessment should be carried out whenever an operator is transferred to a different machine.

#### **4.5    *Supervision During Training***

Personnel undergoing training should be appropriately supervised.

#### **4.6    *Proof of Training***

The concrete pump operator should always be able to show the Owner or site management proof of training.

#### **4.7    *Additional Training***

The appointed signaller and operator should be instructed on:

- a.**    the use of the code of signals in **Annex 4**;
- b.**    the use of any communications device supplied;
- c.**    any special risks on the site, e.g. overhead obstructions.

## 5.0 Management of the Concrete Pumping Operation

All concrete pumping pours should be planned to ensure that they are completed safely and that all significant foreseeable risks have been taken into account. Planning should be carried out by personnel who have the appropriate expertise. In cases of repetitive concrete pours, this planning may only be necessary in the first instance, with periodic reviews to ensure that no factors have changed.

### 5.1 Machine Risk Assessment

The concrete pump Owner should be able to supply a risk assessment to the customer, detailing the generic risks in concrete pumping.

### 5.2 Information for the Hirer

To assist the Hirer to select the correct model of concrete pump, the concrete pump Owner should be able to supply details of:

- a. the maximum reach of each concrete placing boom, both horizontally and vertically;
- b. the standard equipment carried on a truck-mounted concrete pump;
- c. the weights of pipeline, placement hoses, delivery hoses and accessories;
- d. the maximum likely loadings for each of the stabiliser bases;
- e. the footprint of the machine with all stabilisers extended in accordance with the manufacturer's instructions for the specific machine;

**NOTE:** Short rigging must only be undertaken on machines specifically equipped with the appropriate safety systems

- f. the boom configuration;
- g. the maximum safe wind speed for the operation of the boom.

**NOTE:** The maximum pressure generated by the pump will depend on the delivery situation and other factors. This should be the subject of discussion between the Owner and Hirer.

### 5.3 Concrete Pump Hire Checklist

The Hirer should make reference to a concrete pump hire checklist, (see **Annex 1**), to assist the Owner to provide the correct machine for the job.

### 5.4 Safe System of Work

Following a site specific risk assessment, a safe system of work should be established by the Hirer and this should be followed for every concrete pumping operation whether it is an individual pour or a series of pours.

The Hirer should include in the safe system of work from the arrival of the truck-mounted concrete pump on site to its departure and the following should be included in the safe system of work:-

- a. the preparation of a method statement;
- b. the planning of the operation;
- c. the selection, provision and use of a suitable concrete pump and boom;
- d. the need for additional delivery pipes in addition to the standard kit carried;
- e. the position of the concrete pump and any necessary preparation of the site for its positioning;

- f.** the site of the pour, taking into account proximity hazards, space availability and suitability of the ground to support the weight of the concrete pump;
- g.** the provision of properly trained and competent personnel who have been made aware of their relevant responsibilities under the Health and Safety At Work, etc., Act 1974 Sections 7 & 8.
- h.** the requirement for all personnel to be able to communicate clearly;
- i.** adequate supervision by competent personnel;
- j.** ensuring that all necessary documentation is available for inspection and valid;
- k.** preventing unauthorised use of the concrete pump and boom;
- l.** ensuring the safety of persons not involved in the pumping operation;
- m.** the provision of a clean-out area, must be taking into consideration all environmental issues; the provision of an adequate piped water supply at the pump position;
- n.** the provision of a supply of suitable and sufficient concrete of a consistency which is readily pumpable at a sustainable rate;
- o.** adequate lighting.

## 6.0 Selection of Concrete Pumps

### 6.1 Documentation

When the pump arrives at site the following documentation should be available prior to the start of the pumping operation.

- a. Inspection Certificate/ Certificate of Conformity if less than 12 months old;
- b. operators CPCS card (or other equivalent scheme);
- c. daily /weekly check sheets.
- d. Evidence of operators medical fitness

**Evidence of the Roadworthiness Inspection Sheets should be supplied if requested.**

### 6.2 Size and Pumping Capacity

Concrete pumps are available in a number of sizes and pumping capacities. The characteristics of each concrete pump should be considered in relation to the job requirements.

### 6.3 Hirer's Responsibilities

Responsibilities of the Hirer in requesting a suitable concrete pump should include:

- a. access to and egress from the site suitable for the size of the machine;
- b. sufficient area for all the machine's stabilisers to be fully deployed;
- c. the ability of the ground to support the loads likely to be imposed by the machine's stabilisers;
- d. underground restrictions, e.g. cellars under pavements, cables close to the surface;
- e. overhead obstructions, e.g. cables and structures; it is the Hirer's responsibility to devise a safe method of working in the vicinity of overhead cables;
- f. the reach of the boom to the most remote point of the concrete pour;

**NOTE:** *In the case of truck-mounted pumps, consideration ought to be given to the optimum concrete placing boom size for site conditions. Correct selection of the concrete placing boom will reduce any safety risks.*

- g. suitable access for the ready-mixed concrete truck to the receiving hopper of the concrete pump;
- h. the need for a signaller in circumstances where the operator will not be able to see the delivery end of the pipe-line or hopper;
- i. adequate protection of the permanent works from potential damage by the concrete placing boom;

**NOTE:** *It is the Hirers responsibility to ensure that adequate insurance is in place in the event of damage;*

- j. any special operational requirements or limitations imposed;
- k. the need for additional delivery pipeline to supplement the boom pipeline;
- l. the need for properly designed support for the additional pipe-line;
- m. the need for the Hirer to maintain any Hirer-owned pipeline, for which the concrete pump Owner has no responsibility;

- n. the conditions of hire, particularly in respect of insurance aspects.

#### **6.4     *Machine Selection***

The concrete pump Owner should select the machine to be sent to a site on the basis of the following:-

- a. information provided in item **6.3** above;
- b. the distances to be driven to and from the site by the operator to reduce the road safety risk element;
- c. the hours worked by the operators on the previous day and the estimated rest period between their jobs;
- d. the need for additional labour, e.g. for pipeline work.

## **7.0 Travelling to and from the Site (Truck-mounted Concrete Pumps)**

### **7.1 *Place of Work***

Employers and employees should consider the journey in the truck-mounted concrete pump to and from the site as part of the work place.

### **7.2 *Planning Journey Time***

Sufficient time should be allocated by the employer to allow the concrete pump operator to drive to the site without the need to exceed speed limits or take risks on the road in general.

### **7.3 *Pre Journey Checks***

The concrete pump operator should use the time allocated by the employer to ensure that the concrete pump is safe for the road, e.g. by checking the function of the lorry's lights and other essential pre-driving checks.

### **7.4 *Behaviour on the Road***

The concrete pump operator should not take unnecessary risks on the journey, taking care for his own safety and health and that of other road users and others who may be affected by his actions.

### **7.5 *Trailer-mounted Concrete Pumps***

The delivery, loading/unloading and collection of trailer-mounted concrete pumps and additional placing equipment should be adequately planned between the Hirer and the Owner.

## **8.0 Arrival on Site and Setting Up the Machine**

### **8.1 General**

The concrete pump operator is responsible for the correct operation of the concrete pump in accordance with the manufacturer's instructions and within the safe systems of work.

### **8.2 On Arrival**

On arrival, the concrete pump operator must report to the site office.

### **8.3 Site Induction**

The concrete pump operator must attend site safety induction training as required by the site.

### **8.4 Authorised Access Routes**

The concrete pump operator must use only authorised routes across the site.

**NOTE:** *It is the Hirer's responsibility to assess the ground conditions and confirm its suitability to support the lorry-mounted concrete pump. Reference Information provided in item 6.3 above. The concrete pump operator should use only authorised routes across the site. Where possible, site routes should be taken to eliminate reversing. Where this is not possible, the Hirer/contractor should supply a banksman to assist with reversing when necessary. The use of CCTV cameras and other visual aids should be considered to reduce the risk of collisions.*

### **8.5 Siting the Machine**

The position of the machine must be determined by the Hirer after discussion with the Owner, bearing in mind the ground conditions, the distance to the concrete pour, suitable access for the concrete delivery lorries and the working position of the concrete pump operator. This requirement should be confirmed to the concrete pump operator on site during a pre-start briefing. Underground voids, e.g. new drainage trenches and manholes, should be avoided when determining the positions of stabilisers.

### **8.6 Overhead Cables**

Overhead cables must be considered when setting up the machine; the boom must never be positioned where it might touch overhead cables or where electricity might arc to the boom. A safe method of working in the vicinity of overhead cables must be included, if appropriate, in the overall safe system of work.

**NOTE:** *Further guidance is given in HSE Guidance Note GS6 - Avoidance of danger from overhead electric power lines.*

### **8.7 Proximity of Cranes and Other High Reach Equipment**

Regard should be given to the proximity of cranes or other concrete pump booms, especially when working areas overlap.

### **8.8 Maximum Operating Wind Speed**

The manufacturer of the machine specifies the maximum wind speed in which it is safe to operate a concrete placing boom. It is the responsibility of the Hirer to verify that the wind speed at the site is not in excess of the limit specified by the manufacturer.

## 8.9 *Use of Stabilisers*

### 8.9.1 Manufacturer's Instructions

All stabilisers must be fully deployed in accordance with the manufacturer's instructions; where appropriate, sole-plates should be used under the stabiliser base plates to spread the loading from the machine. Reference: - Strategic Forum Plant Safety Group for Ground Conditions for Construction Plant.

### 8.9.2 Sole or Spreader Plates

All sole-plates must be of adequate strength and size to support and distribute the loads likely to be applied.

### 8.9.3 Responsibility for Ground Conditions

It is the responsibility of the Hirer to provide suitable hard standing for the machine to be set up; it must be capable of adequately supporting the loads likely to be imposed on it. If the concrete pump operator is concerned about suitability of the ground conditions they should consult their manager before proceeding with operations.

### 8.9.4 Stabiliser Loading Information

The machine should carry information on the maximum load likely to be applied to each stabiliser.

## 8.10 *Pre-use Checks*

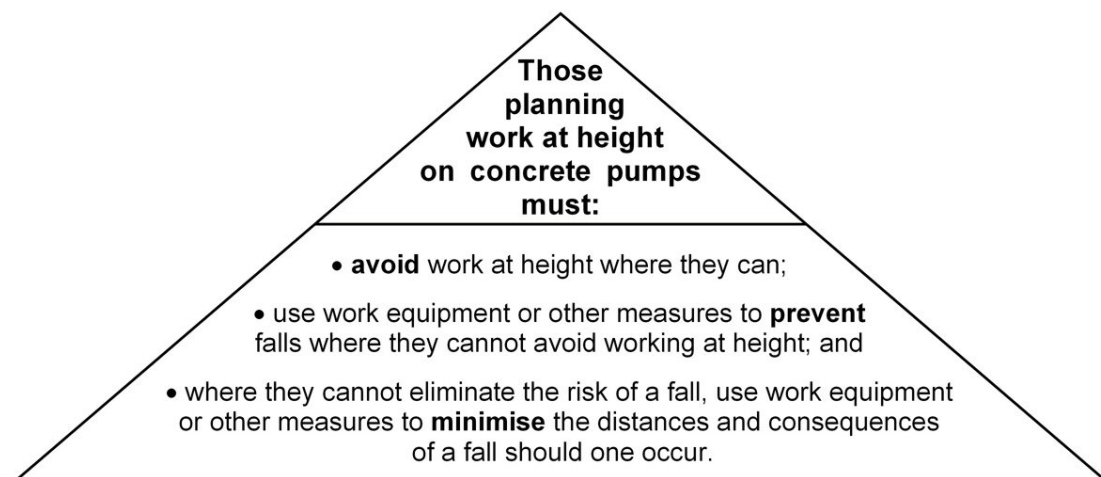
The function of all controls and safety devices should be checked by the concrete pump operator for correct working before pumping commences.

## 8.11 *Guards*

Guards to all dangerous moving machinery must be in place at all times while the machine is working.

## 8.12 *Working at Height*

When considering the risk of working at height during the cleaning process, the hierarchy of control should be followed.



#### **8.12.1 Hierarchy of Measures**

- a. avoid work at height wherever possible and actively seek solutions to facilitate this;
- b. if this is not possible, use “collective” means of prevention such as guardrails;
- c. if this is not possible, use “personal” means of prevention such as work restraint;
- d. if this is not possible, use “collective” means of protection such as air bags;
- e. if this is not possible, use a personal fall protection system such as a work positioning system or fall arrest system.

#### **8.12.2 Training**

All persons working at height must be trained to ensure that they are competent to work at height and are able to use any equipment such as personal fall protection systems safely.

#### **8.12.3 Selection of personal Fall Protection Equipment**

Where a risk assessment indicates that a personal fall protection system is required, a working positioning system should always be used in preference to a fall arrest system. Where the use of fall arrest personal fall protection systems is unavoidable, there will be a risk of the wearer being left suspended following a fall and arrangements must be made to ensure that they can be rescued in a safe and timely manner.

### **8.13 *Pipelines***

Pipelines for conveying concrete from the pump to the pour position may be supplied and set up in a number of ways:-

1. For basic single pours where the distance from the pump to the pour point does not exceed 30m the Owner will send the pump, operator and standard pipeline equipment to site. The operator sets the pipeline up, with assistance from site, carries out the pour and removes the equipment from site.
2. For basic single pours where the distance from the pump to the pour point exceeds 30m the Owner will send the pump and operator to site with a second man (linesman) and a vehicle containing the pipeline equipment. The operator and linesman set the pipeline up, with assistance from site, carry out the pour and remove the equipment from site.
3. For multiple pours the pipeline is normally delivered to site and set up beforehand, remaining on site until the pour's have been completed. The pipeline can either be set up by Owner's personnel or the Hirer's personnel. The concrete pump will then come to site with the operator, and possibly a linesman, to carry out each pour. It is essential that responsibility for the pipeline is agreed between the Owner and Hirer.
4. On large contracts the Hirer may choose to supply their own pipeline which they will set up themselves and maintain. The Owner will then send the pump to site as required whilst the Hirer takes full responsibility for the pipeline.

Whichever method of supply and set up is used, it is essential that the operation is planned effectively and that the installation is inspected by a competent person before being taken into use, to ensure that it is safe. This inspection should include checks that all couplings have been fitted with gaskets and safety pins, and that flexible hoses have not been used in place of steel bends. It is important to remember that overall responsibility for the operation rests with the Hirer, irrespective of who supplies and sets up the pipeline.

## **9.0 During the Pour**

### **9.1 General**

If, in the opinion of the concrete pump operator, there is a risk of injury to himself/herself or other persons, damage to property or his machine, caused by the operation of the pump or boom, the operation must cease immediately and consultation with the Hirer sought without delay.

### **9.2 Avoiding Overhead Power Lines**

The boom must never be operated in a position where it might come into contact with live electricity cables or approach them to a point where the electricity arcs to the boom. The concrete pump operator must work to the safety clearance distances as instructed by the Hirer before work commences. If the operator has any concerns regarding safe approach distances to overhead lines he should contact his manager.

**NOTE:** Further guidance is given in HSE Guidance Note GS6 - Avoidance of danger from overhead electric power lines.

### **9.3 Control of Noise**

The combination of the noise levels from different items of plant may exceed the action levels in the Control of Noise at Work Regulations 2005. If this cannot be eliminated or reduced to a safe level, the concrete pump operator should be supplied with appropriate ear defenders and be instructed on the use of them in accordance with the Regulations.

### **9.4 Remote Controls**

The availability of a remote control box, whether operated by cable or by radio signals, allows the concrete pump operator to select the optimum position from which to operate the pump and boom. This position will vary according to the work in hand. The concrete pump operator should select the position that offers the safest overall position for the job.

When a remote control box is in use, any other controls on the machine must be isolated or access to them by unauthorised personnel prevented.

### **9.5 Use of Signallers**

#### **9.5.1 Requirement for Signallers**

If the concrete pump operator is required to position himself where he cannot see the concrete placing gang, the Hirer must supply a signaller to give appropriate signals to the concrete pump operator (see **Annex 4**).

#### **9.5.2 Signal Code**

A code of signals must be agreed between the concrete pump operator and a representative of the concrete placing gang before pumping starts (see **Annex 4**).

#### **9.5.3 Concrete Level Monitor**

When the concrete pump operator cannot see the concrete level in the machine's receiving hopper, it is the responsibility of the Hirer to appoint a person who is competent to monitor the level of concrete in the receiving hopper and convey signals to the concrete pump operator when the level is at its safe minimum. It is not acceptable to hold the driver of the ready-mixed concrete truck responsible for advising the concrete pump operator when the concrete level is low in the receiving hopper.

#### 9.5.4 Responding to Signals

The concrete pump operator should at any one time respond only to the signals from the appointed signaller, who should be clearly identified.

The concrete pump operator must respond immediately to signals given by a signaller.

#### 9.6 **Personnel in the Vicinity of the Concrete Pump**

Until concrete is flowing smoothly out of the end of the delivery hose, or when a blockage occurs in the boom pipeline, all personnel should remain clear of the delivery hose and the placing boom.

The danger zone is the area around the delivery hose in which the delivery hose can strike out. The diameter of the zone is twice the length of the delivery hose.

#### 9.7 **Pipeline Blockages**

Clearing pipeline blockages is a potentially hazardous task, as workable concrete has such a short life. This means that time is of the essence and if a clear risk assessment and robust method statement setting out roles and responsibilities is not in place, the risk of serious accidents may be increased.

All personnel dealing with the pipeline should be trained in dealing with blockages etc. Whilst the concrete pump operator may be the person on site with the most experience of clearing blockages, it is unreasonable to expect him to have control over a long pipeline. It is important to remember that overall responsibility for the management of the operation will rest with the Hirer.

If the concrete pump operator needs to open the delivery pipeline to clear a blockage, he must first release the pressure inside the pipeline as much as possible, e.g. by reversing the pumping action. The pipeline must be treated as being pressurised at all times. Appropriate and adequate hand and eye protection must be worn when opening the delivery pipeline.

The Hirer/ (sub) contractor should ensure that site personnel **DO NOT** under any circumstance open or attempt to open the delivery pipeline under pressure.

Where a blockage has to be cleared the following procedure should be followed:-

- Stop pumping immediately;
- Reverse the pump until the pressure is released (**DO NOT** increase the pressure to clear the blockage as an alternative to the following procedure);
- Locate area of blockage, check the following:-
  - reducer (if applicable);
  - bends;
  - flexible rubber hoses;
  - outlet of pump.
- Establish an exclusion zone (move non-essential personnel out of the area)
- Refer to **10.9a, 10.9b & 10.9n** for additional requirements;
- Disconnect the delivery pipeline at the safest point near to the blockage;
- Clean out the blockage, re-prime and re-connect ensuring that safety pins and clips are in place;
- Recommence pumping operation to ensure blockage is clear, if not repeat the procedure as above.

**NOTE:** *It is essential that the manufacturer's instructions or guidance on blockage clearing is followed in all situations*

## **9.8 Concrete Placing Gang Training**

The Hirer/ (sub) contractor should ensure that members of the concrete-placing gang/ linesman are adequately trained in the safe placing of concrete. In particular, they should be aware of the risks associated with the use of placement hoses such as hose whipping.

## **9.9 Use of PPE**

All members of the concrete placing gang and linesman should wear, as a minimum, a safety helmet, safety footwear, impervious gloves / gauntlets, suitable eye protection and high visibility clothing.

**NOTE:** Concrete operatives often work in concrete, consequently all footwear should be impervious, clothes should be prevented from becoming contaminated with concrete and arrangements should be in place to ensure that any contaminated clothing is dealt with appropriately.

## **9.10 Exhaust Fumes**

Arrangements must be made to extract exhaust fumes when the machine is operating inside a building or a confined space.

## **9.11 Leaving the Concrete Pump Unattended**

If the concrete pump has to be left unattended, the operation of the boom and pump must be isolated.

## **9.12 Maximum Hose Length**

The maximum length of end hose to be suspended from the end of a boom is specified by the manufacturer and must not be exceeded as this may affect the strength and/or stability of the pump unit.

## **9.13 Falling Concrete**

Concrete must be prevented from falling out of the delivery hose when the boom is being manoeuvred over personnel or property; where necessary a Blanking Device, fitted in accordance with the manufacturer's instructions, should be used.

**NOTE:** In using such Blanking Devices care must be taken to ensure that additional hazards are not introduced.

## **9.14 Use of Concrete Placing Boom as a Crane**

The boom must **never** be used as a means of hoisting/lifting equipment.

## **9.15 Securing Pins**

Purpose designed securing pins must be fitted to all pipe couplings to prevent them from opening accidentally. The tip hose should also be fitted with safety straps/chains to prevent the hose falling in the event of pin failure.

## **9.16 Hopper Grill**

The hopper grille must be in a closed position at all times during the pumping operation.

## **9.17 Movement of Lorry-mounted Concrete Pumps on Site**

### **9.17.1 Travelling Configuration**

If the lorry-mounted concrete pump has to be moved on site, the boom must always be folded to the travelling position. The only exception to this recommendation would

be a procedure laid down by the machine manufacturer that allows otherwise. Any procedure endorsed by the equipment manufacturer should be strictly adhered to as laid down in their operating instructions, as the risk of the machine turning over is greatly increased. However, the safest and accepted procedure is to return the boom to its folded travelling position whenever the machine is to be moved.

#### **9.17.2 Site Traffic Management Arrangements**

The concrete pump operator must comply with the site's traffic management arrangements.

It is the responsibility of the Hirer to ensure that alterations in the site traffic management arrangements necessitated by the presence of the mobile concrete pump and concrete-mixer lorries are adequate and implemented.

#### **9.18 *Washing Out of Ready-mix Truck Chutes***

Site managers should ensure that ready-mixed concrete trucks do not wash out their chutes into the receiving hopper of the concrete pump. This can cause damage to the pump unit and affect concrete quality. Washing out arrangements should be agreed between site management and ready-mix concrete suppliers.

## **10.0 Work with Pipelines**

### **10.1 Resources**

The Hirer is responsible for providing adequate resources to assist the concrete pump operator in handling pipes and accessories.

### **10.2 Selection of Equipment**

Pipes and couplings must be selected in accordance with the anticipated pressure in the pipeline.

***NOTE:** The maximum pressure generated by the pump will depend on the delivery situation and other factors. This should be the subject of discussion between the Owner and Hirer.*

### **10.3 Inspection**

The concrete pump operator/Hirer should carry out regular inspections of the standard delivery pipeline supplied with the machine, in accordance with a planned maintenance schedule to ensure that they are fit for continued use.

Recommendations for inspections are given in Annex B.

***NOTE:** The inspection of additional pipeline, beyond the standard pipeline supplied with the machine, is the responsibility of the Hirer.*

### **10.4 Setup of pipelines**

The setting up of all pipelines, not supported by the machine, should be under the direction and control of the Hirer.

### **10.5 Pipeline Support**

All pipelines must be adequately supported.

### **10.6 Couplings**

All couplings must be in good order and correctly fitted with a good rubber seal and a securing pin; the bolts of bolted couplings must be capable of being tightened fully.

### **10.7 Pipelines Fitted to Scaffolding**

#### **10.7.1 Loadings and Attachment**

Before a pipeline is fitted to a scaffold/falsework, the Hirer must confirm that the scaffolding/falsework is designed and constructed to take the extra loading to be imposed. Purpose-made clips must be used to attach the pipeline to the scaffold/falsework.

#### **10.7.2 Working Platforms**

Working platforms, in compliance with the Work at Height Regulations 2005, must be provided for the purpose of attaching pipelines to scaffolding.

### **10.8 Protection of Delivery Lines**

Where personnel and /or vehicles are required to pass over delivery lines, then suitable ramps should be provided.

### **10.9 Cleaning Delivery Lines Using Compressed Air**

On occasions it will not be feasible, practicable or even possible to clean out the delivery pipeline by the conventional method. Such situations may include exceptionally long pipelines, the use of fast-setting concrete, very hot weather when

the concrete pump has broken down, etc. It may be necessary in these circumstances to use compressed air.

The use of compressed air to clean out a pipeline should only be used where there is no practical alternative. The operation must be carried out under the close supervision of a suitably trained person.

- a. It is essential that personnel involved in the operation wear protective clothing, a safety helmet and eye protection, preferably a full face visor of the suitable grade and bearing a CE mark;
- b. The pump operator should establish effective communications with site personnel and should ensure that all personnel stand clear of the pipeline, particularly at the discharge end;
- c. All flexible hoses must be removed from the pipeline;

**NOTE:** *This does not apply to CFA ground hoses used in piling operations*

- d. The pipeline must be fully supported and secure;
- e. There must not be any bends in the final 15 metres of the pipeline, unless the pipeline is adequately secured;
- f. A sponge wash out ball should be inserted into the pipeline at the end from which the pipeline is to be blown out;
- g. The washout adapter should be attached to the end of the pipeline using a coupling, rubber seal and securing pin. The air entry and emergency pressure release valves must be checked to ensure that they work correctly;
- h. A ball-catcher attachment must be fitted to the discharge end of the pipeline to catch the sponge wash out ball, which could otherwise be expelled with great force;
- i. The air line from the compressor should then be attached to the air entry control valve on the washout adapter;
- j. The compressed air should be introduced gradually, sufficient only to move the sponge rubber cleaning device steadily along the pipeline;
- k. A competent assistant should follow the progress of the sponge rubber cleaning device while the concrete pump operator controls the ingress of compressed air. By tapping the pipes with, for example, a hammer, the assistant can establish which pipes have been emptied;

**Warning - The assistant should stay away from the end of the delivery line.**

- l. As the sponge rubber cleaning device progresses and the resistance of the concrete decreases, the flow of air introduced into the pipeline should be reduced by the concrete pump operator;

**Note:** *A way of achieving this is to shut off the flow of air altogether as the assistant approaches the final 25% of the delivery line.*

- m. Air must be exhausted via the emergency valve whenever the speed of the discharge of concrete becomes too rapid;
- n. The pipeline must be considered to be pressurised during the cleaning process and no couplings should be loosened or removed unless the pressure in the pipeline has been released and this has been confirmed by the concrete pump operator (see 9.7)

To clean delivery lines safely using compressed air the following equipment is required:

- a wash out adapter, designed for the purpose and equipped with an air entry control valve and an emergency pressure release valve,
- sponge wash out balls,
- a ball-catcher attachment,
- a compressor not delivering more than 7 bar pressure.

## **11.0 Pumping Special Types of Concrete**

### **11.1 General**

Many forms of concrete exist beyond the standard mixes that can be pumped. Each should be considered as a special case. The nature of the concrete can have serious consequences for the concrete placing boom and for the concrete pump operator.

### **11.2 Effects of Additives**

The effects of chemicals added to the concrete must be considered by the Hirer and the concrete supplier, both in terms of health effects and the effects on the pump ability of the concrete mix. Information on the additive which is relevant to health and safety must be given to the client by the supplier.

### **11.3 COSHH Assessments**

The Hirer should assess the risks to the health of the concrete pump operator and give the operator information and advice on the risks and the protective measures necessary. This is a requirement of the Control of Substances Hazardous to Health Regulations.

### **11.4 Concrete Density**

The density of special concretes should be considered, especially when pumping through a boom. When very heavyweight concrete, that containing heavy natural aggregates such as barites or magnetite or manufactured aggregates such as iron or lead shot, is to be pumped, the concrete pump boom manufacturer's recommendations must be considered.

### **11.5 Foamed and Air-entrained Concrete**

Foamed concrete and air-entrained concrete can be compressed in the pipeline, particularly if there is a blockage or partial blockage. It is essential that all pressure is dissipated from the pipeline before it is opened.

## **12.0 Cleaning out the Machine**

### **12.1 General**

Cleaning out a concrete pump and its concrete placing boom is a specialist operation, which is to be left to the concrete pump operator. If the concrete pump operator requires assistance when cleaning out the delivery line, this has to be carried out under supervision.

### **12.2 Water Supply**

Truck-mounted concrete pumps generally carry their own supply of water for cleaning the boom pipes and hopper. However, in cases of more than one pour, it may be necessary for the site to provide a water supply. Trailer or skid-mounted concrete pumps need a separate water supply or bowser.

### **12.3 Designated Washout Areas**

The cleaning process involves the deposit of some waste concrete on the site. The concrete pump must only be washed out in the area designated by the Hirer.

### **12.4 Isolating the Pump**

Before working in the receiving hopper, the concrete pump operator should always switch off the engine and remove the keys, vent the hydraulic pressure and ensure that the agitator control lever is in the neutral position.

## **13.0 Leaving the Site (Truck-mounted Pumps)**

### **13.1 *Stowing***

Before leaving the site, the concrete pump operator must ensure that the concrete placing boom is properly stowed and that all equipment is securely loaded.

### **13.2 *Emptying the Receiving Hopper***

Concrete should not be carried in the receiving hopper on the highway.

### **13.3 *Checking of Tyres***

The vehicle tyres should be checked for damage, cuts, nails or screws in the tread and material trapped between twin wheels.

## **14.0 Personal Protective Equipment**

### **14.1 General**

The concrete pump operator is likely to be exposed to a variety of working conditions; the majority of these cannot be avoided. Accordingly, suitable PPE conforming to the appropriate British Standard has to be issued to the concrete pump operator.

### **14.2 Appropriate PPE**

The personal protective equipment worn by the concrete pump operator may include:

- a. a safety helmet;
- b. safety footwear;
- c. overalls;
- d. eye protection;
- e. ear defenders;
- f. fall protection equipment;
- g. high visibility clothing conforming to BS EN 471;
- h. impervious gloves or gauntlets;
- i. waterproof clothing.

### **14.3 Charging for PPE**

Concrete pump operators should not be charged for PPE.

### **14.4 PPE Replacement**

PPE should be replaced by the employer as necessary.

### **14.5 Additional PPE**

Other PPE should be supplied when a risk assessment deems this necessary.

## **15.0 Concrete Pump Inspection and Testing**

### **15.1 Regulatory Requirements**

A concrete placing boom is not an item of lifting equipment as defined in the *Lifting Operations and Lifting Equipment Regulations 1998* [LOLER]. The *Provision and Use of Work Equipment Regulations 1998* (PUWER) require that work equipment (including concrete pumps) is inspected at regular intervals. (See **Annex 2**)

### **15.2 EC Declaration of Conformity**

An EC Declaration of Conformity must be issued by the manufacturer for each new concrete pump supplied; a copy of this declaration and, where appropriate, a copy of the machine's inspection certificate, must be made available for viewing on the machine.

### **15.3 Inspection**

In accordance with the *Provision and Use of Work Equipment Regulations 1998*, concrete placing boom must be inspected "*at suitable intervals ..... to ensure that health and safety conditions are maintained and that any deterioration can be detected and remedied in good time*".

### **15.4 Inspection Frequency**

A Concrete Pump should be inspected:-

- every 500 operating hours and
- at least once a year by a competent person who has the necessary knowledge and experience to carry out that duty.

The manufacturer of the Concrete Pump or the competent person appointed to inspect it may specify a more frequent inspection period because of the machine's age, condition or operating conditions, etc.

### **15.5 Inspection Certificates**

A certificate of inspection should be issued by the competent person following each inspection; a copy should be made available for viewing on the machine. These may be stored in any way appropriate to the Owner of the machine, i.e. in paper format, electronically, etc. **Annex 6** gives details of the information which the certificate should contain.

### **15.6 Safe Working Load**

The safe working load of the machine, i.e. the maximum length of delivery hose full of concrete to be suspended from the concrete placing boom, should be clearly marked on the machine and shown on the inspection certificates. Any other conditions, e.g. the deployment of stabilisers, should be noted on the certificate.

### **15.7 Retention of Inspection Records**

Following an inspection in line with Annex B of BS EN 12001:2003, the record should be retained for a period of at least three years to prove a regular inspection regime.

### **15.8    *Weekly and Maintenance Inspections***

Inspections should be completed by the concrete pump operator on a weekly basis at least, and by mechanical staff carrying out routine services. A written record of the inspections should be retained and be available at all times for examination. An example of a daily and weekly checks and inspections record is given in **Annex 7**.

### **15.9    *Sale of Used Equipment***

If a used concrete placing boom is sold, the current certificate of inspection and its EC declaration of conformity (where applicable) should be supplied to the buyer.

## **16.0 Maintenance**

### **16.1 General**

As with all machinery, good maintenance of a concrete pump is paramount to safety. Road safety and on-site safety have both to be considered when planning a maintenance system. A good defect reporting and repair system is also vital.

Although vehicle mounted concrete pumps are currently exempt from both the commercial vehicle *Operators Licensing and Plating & Testing Regulations*, the *Road Vehicles (Construction and Use) Regulations* (Reg. 100) require that they should “*at all times be in such condition, ..... that no danger is caused or is likely to be caused to any person in or on the vehicle or on a road.*” As a vehicle mounted concrete pump has the potential to cause as much damage in a road traffic accident as any other large vehicle, it is best practice to follow the recommendations set out in the manufacturer’s service manual. These normally set maintenance intervals based on both engine hours run and distance travelled, whereby the first parameter reached determines the need for maintenance.

### **16.2 Maintenance Inspections**

The concrete pump Owner should carry out regular inspections of the concrete pump and vehicle to ensure that they are fit for use. Maintenance and inspection schedules should correspond to those required by the Vehicle and Operator Services Agency (VOSA) and detailed in VOSA’s *Guide to Maintaining Roadworthiness*.

### **16.3 Defects Reporting and Recording**

Any defect that, in the opinion of the concrete pump operator, would affect the safe operation of the concrete placing boom and its supporting structure and vehicle should be recorded on the daily and weekly maintenance checklist and handed to a manager immediately.

**Note:** *Any defects affecting vehicle safety in respect of Road Traffic Act requirements have to be reported immediately to the maintenance department.*

### **16.4 Minor Defects**

Defects of a minor, non-safety related nature should be recorded on the daily and weekly maintenance checklist. They should be recorded weekly until the defects have been repaired.

### **16.5 Preventive Maintenance**

A programme of servicing the vehicle, the concrete placing boom and its supporting structure and the concrete pump should be devised as a part of a preventative maintenance system. The period between services may be determined by the manufacturer or the Owner of the machine and may be based on mileage, the number of hours worked or a period of time.

### **16.6 Testing of Vehicle Brakes**

The braking system should be serviced and tested at least every six months.

### **16.7 Retention of Maintenance Records**

Maintenance and service records should be retained for at least three years to prove a regime of regular maintenance.

It is very helpful to retain inspection records for the whole life of the machine as this will enable the effectiveness of maintenance to be evaluated and failure trends established.

Setting up a machine history file for all machine related records will ensure that all information covering the purchase, use, maintenance and inspection of the machine are available in one place and can be easily accessed.

## Annex 1 – Concrete Pump Hire Checklist

1	Date of Hire	
2	Name of Contractor	
3	Site Address	
4	Size of Boom Required	
5	Site Visit Required	
6	Site Contact Name	
7	Site Telephone Number	
8	Concrete Supplier and Mix Details	
9	Concrete Supplier & Telephone Number	
10	Time Required on Site	
11	m <sup>3</sup> of Concrete to be Pumped	
12	<b>Special Requirements:-</b> <ul style="list-style-type: none"> <li>▪ Linesman</li> <li>▪ Extra Pipes/Compressor/Water Supply</li> <li>▪ Spark Arrester</li> <li>▪ Cash Sale</li> <li>▪ Steel Fibre Concrete</li> </ul>	
13	Provisional or Confirmed Booking	
14	Overhead Power Cables	
15	Order Number	
16	Washout Area	
17	Correct quantity of Cement or a Primer for Grout	
18	Adequate Insurance Cover	
19	Ground Condition Assessment	
20	Name of Competent Person compiling the Risk Assessment and Method Statement	

## **Annex 2 - Inspection of Concrete Pumps**

An inspection should include as a minimum (where applicable):

- a.** a visual inspection of all sections of the boom, its supporting structure, securing devices and stabilisers;
- b.** non-destructive testing of the structure and welds when it is deemed necessary by the competent person;
- c.** the opening up of concealed or encased parts to the extent required by the competent person;
- d.** measurement of backlash / play in the slewing system;
- e.** measurement of wear in the slewing rack thrust pad;
- f.** lift in the slewing ring;
- g.** the integrity of the slewing ring bolts;
- h.** measurement of wear in pins and bushes at the boom joints;
- i.** a check on the security of boom pins;
- j.** the condition of boom pipe brackets;
- k.** the presence of security pins in pipe couplings on the boom pipeline;
- l.** the condition of the boom tip safety chain and its anchorage;
- m.** the correct operation of lock valves on the boom's hydraulic rams;
- n.** the stabiliser locking system for both travelling and working;
- o.** the mounting fixtures for the pump sub-frame and the boom pedestal to the chassis;
- p.** the operation of levers and switches on the remote control box(es);
- q.** the condition of the remote control box lead;
- r.** the operation of manual control levers;
- s.** the operation of all emergency stop controls;
- t.** the clear marking of all controls;
- u.** the satisfactory operation of safety switches, e.g. slewing limits;
- v.** the operation of interlock systems, e.g. on the receiving hopper;
- w.** the integrity of the receiving hopper grille;
- x.** the guarding of the concrete pump cylinders' flushing box;
- y.** the guarding of the machine's prop-shaft;
- z.** the guarding of pump and valve change over rams
- aa.** the condition of the machine steps and walkway;
- bb.** the condition of the washing-out adaptor and the sponge cleaning ball catching basket;
- cc.** working lights;
- dd.** appropriate warning signs;
- ee.** the manufacturer's identification plates.

## **Annex 3 – Inspection of Delivery Lines**

### **A3.1.0 Steel delivery lines**

Steel delivery pipelines may be either single wall or double wall. Double wall thickness pipeline consists of an outer layer which provides the necessary strength for pressure containment, and an inner layer of increased hardness which provides improved resistance to wear. Both types should be checked for damage and deformation.

In the case of single wall lines, the wall thickness of the pipeline may be checked using an ultrasonic gauge or similar non-destructive technique. Pipelines should be rejected if the thickness falls below the manufacturer's recommended minimum thickness.

In the case of double wall pipeline, ultrasonic gauges do not normally provide an accurate measurement of wear, and the pipeline has to be broken down into its individual lengths and the thickness measured from the ends using suitable metrology equipment. The thickness should be compared with the manufacturer's recommended minimum thickness and rejected if it falls below it.

**Note:** *The maximum wear in a pipeline normally occurs within the first 300 mm of either end of the pipeline due to turbulence of the concrete following the joint. Figure A3.1 shows a maintenance card on pipeline wall thickness versus pressure for a range of pipe diameters.*

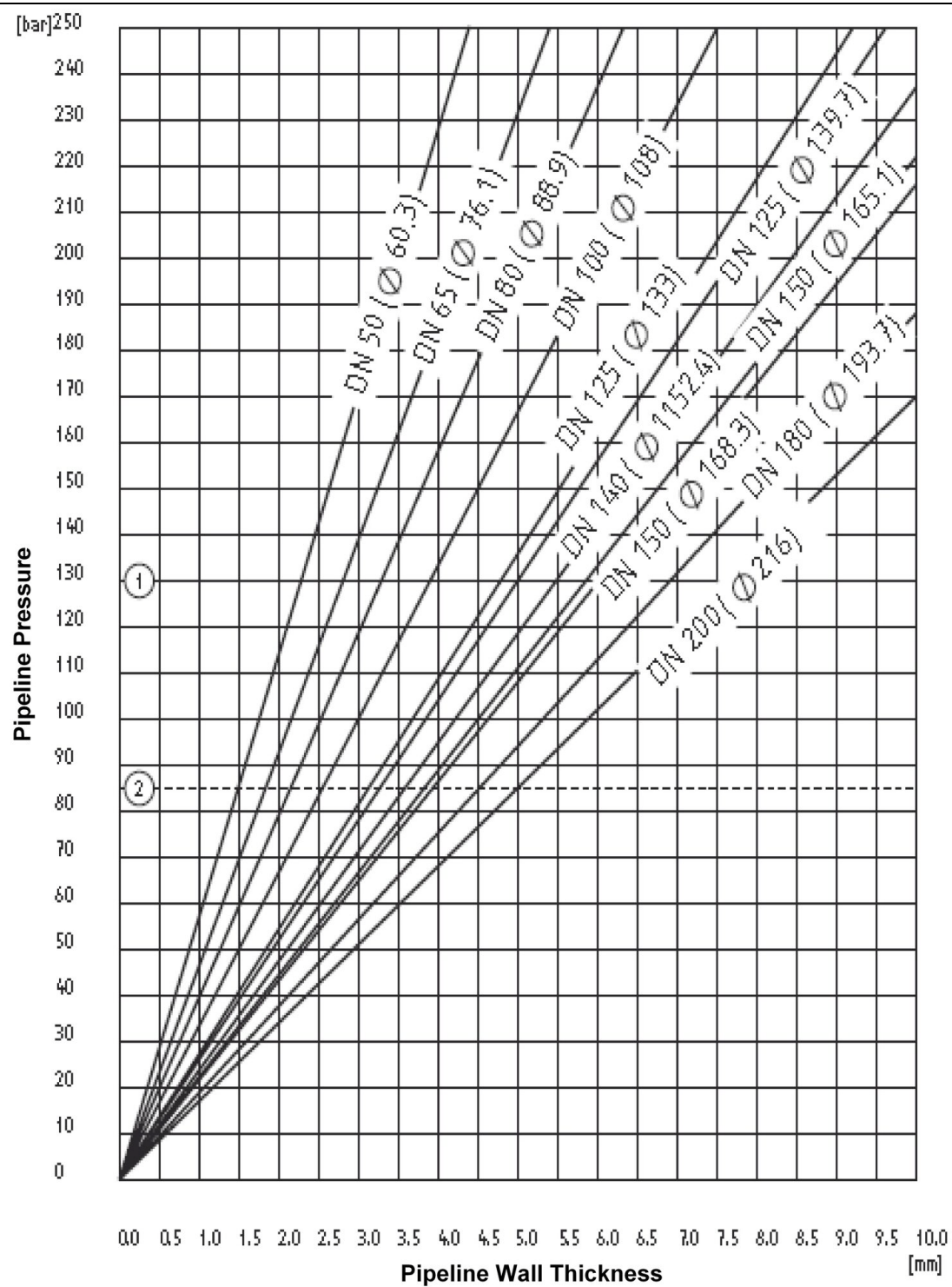
### **A3.2.0 Bends**

Pipeline bends cannot easily be checked for wear using measurement techniques. Wear can be estimated by comparing the weight of a used bend with that of a new bend of similar size.

### **A3.3.0 Flexible pipelines**

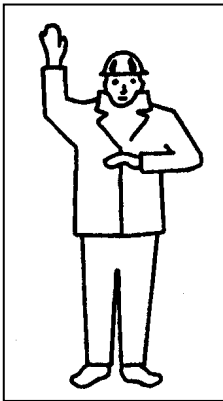
Flexible pipelines should be inspected visually inside and out. If any steel reinforcement wires are visible; the pipeline should be immediately replaced.

**Note:** *Failure of flexible pipeline is often as a result of the pipeline being forced into too tight a radius.*

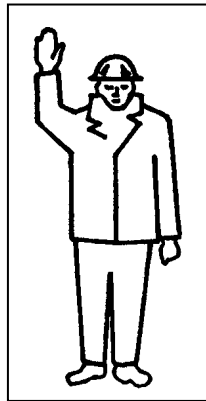


**Figure A3.1 - Pipeline Wall Thickness versus Pressure for a range of Pipe Diameters**

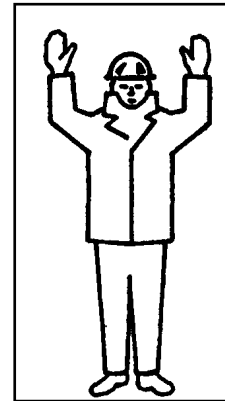
## Annex 4 – Recommended Hand Signals



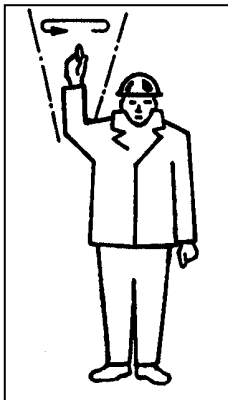
**START PUMPING**



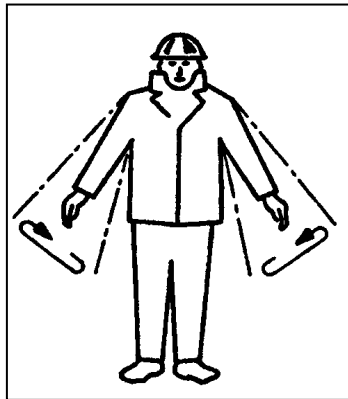
**STOP PUMPING**



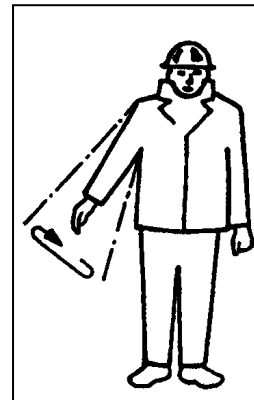
**EMERGENCY STOP**



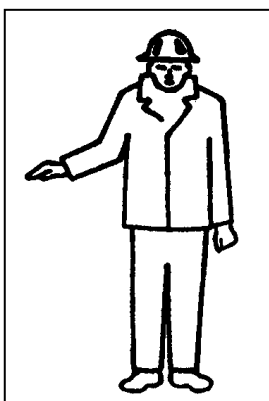
**RAISE THE BOOM**



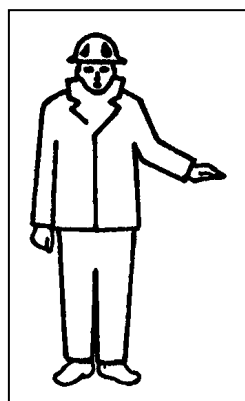
**LOWER THE BOOM SLOWLY**



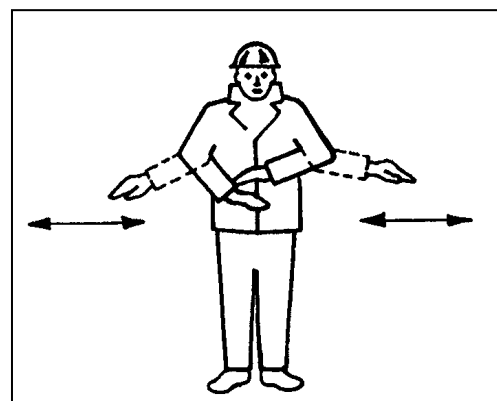
**LOWER THE BOOM**



**SLEW LEFT**



**SLEW RIGHT**



**END OF POUR**

Extract from BS 8476:2007 © BSi

## **Annex 5 – Competence and Competence Schemes**

The duty to ensure that plant operators are competent rests with their employer and the process of ensuring competence requires cooperation between employers, training providers and operators, all of whom have a significant part to play in the process. Many organisations see training as a proxy for competence; this is not the case.

It may indicate a general level of ability to operate plant but does not take into account the difficulty of the task or complexity of environment or experience of the operator. These all have a bearing on the successful management of the task.

The route to ensuring that an operator is competent to perform a task begins with assessment of the individual. An appropriate level of maturity and responsibility must be present within the candidate before they can even be considered as suitable for the task. This assessment is followed by a period of initial training where familiarisation with the operation of the machine and the working environment are built up under supervision; the greater the experience, the less reliance on supervision. At the end of this basic training, a test of the practical and theoretical knowledge should be taken and passed. A CPCS red card or equivalent is then issued denoting that the candidate is trained but not experienced.

After this initial training period, the normal route (although not the only route), is to register for an NVQ or vocational qualification.

This should be a period of development where the operator gains skills and experience ‘on the job’ and is presented as evidence of growing competence in a portfolio for the gaining of an NVQ. Non NVQ routes should use the National Occupational Standards (NOS) as a framework to demonstrate an equivalent level of experience.

On completion of the NVQ, the red card is changed for a blue one, denoting experienced operator. At this point, it is reasonable to assume that the operator is responsible for the safe use of their work equipment with minimal supervision. However, as the degree of difficulty of tasks increase with time, so a commitment to on-going development is necessary. This should be recorded within a log book or equivalent as evidence of being able to undertake more complex tasks.

For more information on competence please see the Strategic Forum for Construction Good Practice Guide on Competence, and the CDM ACoP.

## **Annex 6 – Information to be Contained in an Inspection Certificate**

The following details the information to be given in an inspection certificate following the inspection of a concrete pump in accordance with the Provision and Use of Work Equipment Regulations 1998.

- 1) The name and address of the employer for whom the inspection was carried out.
- 2) The address of the premises at which the inspection was carried out.
- 3) Particulars sufficient to identify the equipment including where known its date of manufacture.
- 4) The date of the last inspection.
- 5) The safe working load of the concrete pump.
- 6) In relation to every inspection of a concrete pump:
  - a) identification of any part found to have a defect which is or could become a danger to persons, and a description of the defect;
  - b) particulars of any repair, renewal or alteration required to remedy a defect found to be a danger to persons;
  - c) in the case of a defect which is not yet but could become a danger to persons –
    - i) the time by which it could become such a danger;
    - ii) particulars of any repair, renewal or alteration required to remedy it;
  - d) the latest date by which the next inspection must be carried out;
- 7) Where the inspection included testing, particulars of any test.
- 8) The date of the inspection.
- 9) The name, address and qualifications of the person completing the certificate; that he is self-employed or, if employed, the name and address of his employer.
- 10) The name and address of a person signing or authenticating the report on behalf of its author.
- 11) The date of the certificate.

## Annex 7 - Example of Daily and Weekly Checks and Inspections Record

### CONCRETE PUMP - OPERATOR DAILY CHECKS AND WEEKLY INSPECTIONS

A copy of this report form must be handed in with the driver's time sheet each week

Name:	Depot or Site Address:	Fleet No.:	Week Ending:
-------	------------------------	------------	--------------

Daily Pre-use Checks		M	T	W	T	F	S	S
1.	Engine oil level(s)							
2.	Fuel level/Leaks							
3.	Coolant level							
4.	Hydraulic Oil Level							
5.	Hydraulic System Leaks							
6.	Tyre Pressures and Condition							
7.	Wipers, Washers							
8.	Lights and Indicators							
9.	Horn and Cab instruments							
10.	Wheel Nuts and Studs							
11.	Operation of Hand or Foot Brake							
12.	Hopper Grill and Safety Interlock							
13.	Delivery Hoses							
14.	Outrigger Support Plates/Timbers							
15.	Grease Pump Unit							
16.	Accumulator Pressure							
17.	Boom Pins and Keyways							
18.	Ground Lines Pipes, Flex's & Clips							
Further model specific checks as specified by manufacturer								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								

Weekly Servicing Checks		
A.	Battery and Water Level	
B.	Windscreen Washer Reservoir	
C.	Grease Boom	
D.	Transmission Levels	
E.	Brake and Clutch Levels	
F.	Hydraulic Oil Level & Filters	
G.	Hydraulic Hoses	
H.	Check A/C Belt	
I.	Grease Slew Ring	
J.	Hydraulic Fan	
K.	Pumping Piston Fixing	
L.	Tyre Condition	
M.	Operation of Boom	
N.	Prop Shaft Belts	
O.	Outriggers for Cracks	
P.	Boom & Boom Pipes for Cracks	
Further model specific checks as specified by manufacturer		
Q.		
R.		
S.		
T.		
U.		
V.		
W.		
X.		
Y.		
Z.		
AA.		
BB.		

Daily Site Checks		M	T	W	T	F	S	S
Ground Conditions								
Overhead Power Cables								
Washout Facility								
Protection for Nearby Cars/Property								
Customer Provided Method Statement								

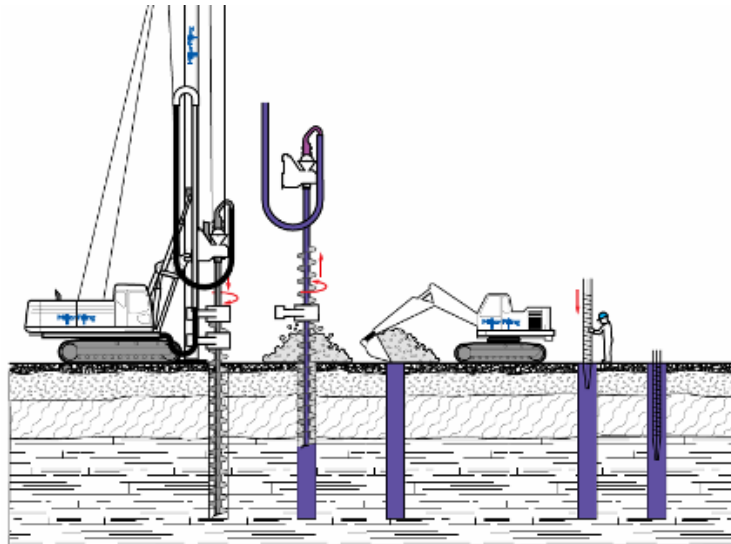
Defect Report	
<small>(All defects must be reported. Those affecting safe operation must be reported and repaired immediately)</small>	
Description:	
Reported to:	Date:
Description:	
Reported to:	Date:
Engine Hrs	Chassis Miles

Operator's observations, requirements for oil, grease etc:	
Operator's Signature:	Date:

Repairs Completed or Comments:	
Fitter's Signature:	Date:
Manager's Signature:	Date:

## Annex 8 - Pumping Concrete to CFA Piling Rigs

A specialist application of concrete pumping is to form CFA bored piles. In this application a hollow stemmed auger is screwed into to ground and as the auger is withdrawn, concrete is pumped through the auger to fill the void created by the withdrawing auger. A rigid steel reinforcement cage is then pushed into the fluid concrete to allow a connection to the overlying structure.



**Figure A1. - Sequence of CFA Operations**

### **A8.1 Specific Features of CFA concrete Pumping.**

- A Static pump is normally used;
- As the piling rig is tracking to different pile positions, rubber ground hoses are normally used;
- To allow the auger to move up and down the rig mast, the rig will include a steel pipe up the side of the mast to a 180° bend termed the “elbow”. From this, there is a loop of rubber hose connecting to the “swan neck” on the rotary table atop of the auger assembly. This hose is termed the “loop hose” or “drop hose”. See Figure A1 above;
- To ensure continuity of concrete supply between delivery loads, a site concrete agitator (similar to a ready-mixed concrete drum) is normally used. The concrete is placed into the agitator either by pumping or by direct discharge using an access ramp;
- As the rate of auger extraction must match the rate of concrete delivery, direct and continuous communication is necessary between the pump operator and the rig operator.

### **A8.2 Site Planning**

- During setting up the site, the pump should be located convenient to the site entrance yet generally centrally to the piling operations;
- The hoses to the rig should be routed so they will not be driven or tracked over. Where road crossings are necessary, hose bridges should be used or the hose buried in a shallow trench;
- The pump operators work area should normally be segregated from other site activities by fencing or other robust demarcation. Within this area, a safe and non-slip working environment is to be provided and maintained;

- d. The pump may be in position for many weeks and will be washed out daily. If there is a risk of wash water finding a route to a sensitive receptor, including groundwater, the area should be lined.

### ***A8.3 Care and Maintenance of the Pumping Line***

- a. All hose connections should be inspected daily before pumping commences;
- b. Hoses should be visually inspected weekly and a record made. Damaged hoses should be replaced and put into quarantine or discarded;
- c. Other elements of the pumping line should be inspected weekly and a record made. This should include all steel pipes, clamps and supports;
- d. All connections on the drop/loop hoses on the piling rig should incorporate a safety sling to independently connect the hose to the rig should the coupling fail;
- e. Care should be taken in coiling and lifting hoses that damage is not caused by kinking or crushing the hose.

### ***A8.4 Cleaning of Concrete Hoses***

Organisations should have in place clear operating procedures to deal with the following operations:-

- a. Priming the pumping line at the beginning of operations;
- b. Cleaning out the pumping line from the pump to the auger tip at the end of operations;
- c. Depressurising and cleaning out section of hose in the case of a blockage. These procedures should include PPE requirements, restraint of the hose, and control of expelled concrete.

## **Annex 9 - Bibliography**

### ***Legislation***

Health & Safety at Work etc Act 1974.  
Management of Health & Safety at Work Regulations 1999/SI3242.  
Workplace (Health, Safety & Welfare) Regulations 1992/SI3004.  
Provision & Use of Work Equipment Regulations 1998/SI2306.  
*L22 Safe use of work equipment*, HSE Books.  
Personal Protective Equipment at Work Regulations 1992/SI2966.  
Work at Height Regulations 2005/SI735.  
Supply of Machinery (Safety) Regulations 2008/SI1597.  
The Construction (Design and Management) Regulations 2007/SI320.  
The Control of Substances Hazardous to Health Regulations 2002/SI2677  
The Control of Noise at Work Regulations 2005/SI1643.  
The Working Time Regulations 1998/SI1833.  
The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995/SI3163.  
The Road Traffic Act 1991.  
The Road Vehicles (Construction and Use) Regulations 1986/SI1078 (as amended)

### ***Standards***

BS 8476:2007, *Code of Practice for the safe use of concrete pumps*.  
BS EN 471:2003+A1:2007, *High-visibility warning clothing for professional use – Test methods and requirements*.  
BS EN 12001:2012, *Conveying, spraying and placing machines for concrete and mortar – Safety requirements*.  
BS EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction*.  
PD 5304:2005, *Guidance on safe use of machinery*.

### ***Other Publications***

HSE Leaflet INDG218 – *Guide to Risk Assessment*.  
HSE Leaflet INDG163 – *Five Steps to Risk Assessment*.  
HSE Leaflet INDG 73 – *Working alone in safety*.  
HSE Guidance Note GS6 - *Avoidance of danger from overhead electric power lines*.  
*Guide to Maintaining Roadworthiness - Commercial goods and passenger carrying vehicles*, Revised 2009, Vehicle & Operator Standards Agency

### ***Useful Websites***

Construction Plant-hire Association	<a href="http://www.cpa.uk.net">www.cpa.uk.net</a>
CITB	<a href="http://www.citb.co.uk">www.citb.co.uk</a>
Health and Safety Executive	<a href="http://www.hse.gov.uk">www.hse.gov.uk</a>
Lifting Equipment Engineers Association	<a href="http://www.leea.co.uk">www.leea.co.uk</a>
Safety Assessment Federation	<a href="http://www.safed.co.uk">www.safed.co.uk</a>
Strategic Forum for Construction	<a href="http://www.strategicforum.org.uk">www.strategicforum.org.uk</a>
UK Contractors Group	<a href="http://www.ukcg.org.uk">www.ukcg.org.uk</a>
Vehicle and Operator Services Agency (VOSA)	<a href="http://www.vosa.gov.uk">www.vosa.gov.uk</a>

## Annex 10 – Working Group Membership

<b>Member</b>	<b>Employer</b>	<b>Representing</b>
B Murphy - <i>Chairman</i>	Camfaud Concrete Pumps Ltd	BCPG
H Byrne	Schwing-Stetter(UK)	BCPG
P Deboo	Pochin Concrete Pumping Ltd	BCPG
J Hallows	CITB	CITB
P Kimberlin	Putzmeister Ltd	BCPG
M Lewis	CPS Concrete Pumping	BCPG
J Moutrie	Health and Safety Executive	HSE
M O'Connor	Health and Safety Executive	HSE
B Reilly	Reilly Concrete Pumping Ltd	BCPG
D Shepard	Premier Concrete Pumping Ltd	BCPG
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## Working in Partnership

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